FORM 1 - Mix Design Submittal

Project Number: STP-0011-02(085)

Project Description: Leflore County

Constructor: Lehman-Roberts Company

Concrete Supplier: MMC Materials

Mix Number: D5021903

MDOT Mix ID

Specified Slump: 6 - 8 inches

Specified Compressive Strength: 5000 psi

Specified Air Content 3 - 6 %

Target Air Content 4.5 %

Required Average strength, f'_{cr} *(check the appropriate box)*

[ ] Based on Field Experience of Trial Mixtures (Supporting data must be attached) ____ psi

[X] Based on Laboratory Trial Mixtures (Supporting data must be attached) 3510 psi, 10 Hours

Material Porperties and Source

Cementitious Material		Type		Source		Specific Gravity
Portland Cement		II		Holcim	St. Gen	3.15
Fly Ash		C		Headwaters	Redfield	2.62
GGBFS (Slag)		Grade 100		Grancem		2.69

Admixtures		Name		Supplier		Dosage, oz, cwt
AEA		MB AE 90		BASF		.25 - 4.0
Type A		322N		BASF		3.0
Type F		GL 7500		BASF		5.0
Note: Dosage rate will require adjustments for field and environmental conditions.						

Aggregate Size	Type	Aggr. #	Sp. Gr. SSD	Sp. Gr. OD	Absorption, %	F.M.	DOT Source #
#67	Rock	APAC	2.56	2.51	2.10	6.88	2-8-11
#8	Rock		2.50	2.41	3.73		
Sand	Natural	APAC	2.64	2.62	0.56	2.74	2-8-11

Water: Local Water Association

-

Material	Quantities lb/yd³ SSD	Absolute Volume yd³		Quantities lb/yd³ Oven-Dry	Absolute Volume yd³
Cement, lb.	800	4.07		800	4.07
Fly Ash, lb	0	0.00		0	0.00
Mix Water, lb.	225	3.61		225	3.61
Slag, lb.	0	0.00		0	0.00
Coarse Aggr., lb. 1	1790	11.21		1752	11.19
Coarse Aggr., lb. 2	0	0.00			
Fine Aggr., lb.	1137	6.90		1131	6.92
Air Content, %	4.5	1.22		4.5	1.22
Total Mass, lb.	3952	27.00		3913	27.00

Mix Design Information:

Mix Class 10 HR Punch-Out Mix

Comments:

Temperature Control EXCLUDED

Mix Revision Number: 0

Organization: MMC Materials

Water / cementitious material ratio: 0.28

Water - Gallons/Yard 27.0

AE 90 3%-6% Air Range

322N 24.0 oz/yard

GL 7500 40.0 oz/yard

The above mix will meet the specified strength in 28 days when tested, placed and handled in accordance with current ASTM and ACI standards and recommended practices. Please include this office on the distribution list for all concrete test reports.

Designed by: Carl Edwards Title: Delta QC Director Date: 9/2/2015

Greenville Area

Customer: **Leham-Roberts Co** Project **STP-0011-02(085)** Lab #: **1**

Plant: **Lab** Notes: **10 HR Punch-Out** Set #: 52

Date: **9/3/2015** Mix Code: **D5021903** f'c: **5000** Size(c.f.): **1.50** Factor: **0.06**

Material	Vol. (c.f.)	SSD mix 1 cu. yd. Wt. (lbs.)	SSD mix lab batch Wt. (lbs.)	Adjusted lab batch Wt. (lbs.)	Actual lab batch Wt. (lbs.)		SSD Specific Gravity	Agg Absorption	Agg. FM
Cement:	4.07	800	**44.4**	**44.4**	44.4	***Holcim St. Gen***	3.15		
Fly Ash:	0.00	0	**0.0**	**0.0**			2.62		
Sand #1:	6.90	1137	**63.2**	**66.4**	66.4	***APAC 2-8-11***	2.64	0.56%	2.74
Sand #2:	0.00	0	**0.0**	**0.0**			0.00		
Coarse agg	11.21	1790	**99.4**	**100.7**	100.7	***APAC 2-8-11***	2.56	2.10%	6.88
Air: **4.50%**	1.22	0							
Water:	3.61	225	**12.5**	**8.0**	8	***City***	1.00		
GGBFS	0.00	0	**0.0**	**0.0**			2.86		
Other:									
Total:	27.00	3952							

ADMIX INFORMATION

Type	oz /cwt	oz /cy	ml /cy	batch ml	actual ml	Brand / Name
Air	*0.50*	*4.0*	*118.3*	*6.6*	*7*	*AE 90*
Type A	*3.0*	*24.0*	*709.8*	*39.4*	*40*	*322N*
Type F	*5.0*	*40.0*	*1183.0*	*65.7*	*66*	*7500*
Other	*0.0*	*0.0*	*0.0*	*0.0*		

PLASTIC TEST RESULTS

Batch Time	***7:30 AM***	% Air	***5.60***
Sample Time	***8:00 AM***	Unit Weight (pcf)	***143.78***
Slump	***7.5***	Yield	***1.53***
Mix Temp.	***84***	Initial set, min.	
Air Temp.	***70***	Final set, min.	

OTHER INFO

Des. w/c	*0.28*
Act. w/c	*0.28*
Des.Un.Wt.	*146.37*
Sand/Agg.	*0.64*
Bag Factor	*8.5*

Aggregate Moistures

	Free h2o Content	Batch free h2o (lbs.)
Sand #1:	*5.19%*	*3.3*
Sand #2:	*0.00%*	*0.0*
Coarse	*1.25%*	*1.2*

Water Added/Withheld

+/- h2o	Added	W/held
0.0	*0.0*	*0.00*

Comments / Notes / Observations

Strength Test Results

Date	AGE	psi	Avg. psi
	4x8 CYLINDERS		
09/03/15	***10 HR***	***3510***	***3510***
09/03/15	***10HR***	***3520***	
09/03/15	***10 HR***	***3500***	
09/04/15	***18 HR***	***4560***	***4497***
09/04/15	***18 HR***	***4600***	
09/04/15	***18 HR***	***4330***	
09/06/15	***72 HR***	***6190***	***6157***
09/06/15	***72 HR***	***6160***	
09/06/15	***72 HR***	***6120***	
10/01/15	***28 Days***		***0***
10/01/15	***28 Days***		
10/01/15	***28 Days***		

Technician who conducted tests: ***Carl Edwards***

Holcim

Material Certification Report

Material:	Portland Cement	Test Period:	01-Jul-2015
Type:	I-II	To:	31-Jul-2015

Certification

This Holcim cement meets the specifications of ASTM C150 for Type I-II cement, and complies with AASHTO M85 specifications for Type I-II cement.

General Information

Supplier:	Holcim (US) Inc.	Source Location:	Ste. Genevieve Plant
Address:	2942 US Highway 61 Bloomsdale, MO 63627		2942 US Highway 61 Bloomsdale, MO 63627
Telephone:	636-524-8155	Contact:	Erin Watson
Date Issued:	17-Aug-2015		

The following information is based on average test data during the test period.
The data is typical of cement shipped by Holcim; individual shipments may vary.

Tests Data on ASTM Standard Requirements

Chemical

Item	Limit[A]	Result
SiO_2 (%)	-	19.4
Al_2O_3 (%)	6.0 max	4.5
Fe_2O_3 (%)	6.0 max	3.2
CaO (%)	-	64.2
MgO (%)	6.0 max	2.5
SO_3 (%)	3.0 max[B]	3.5
Loss on Ignition (%)	3.0 max	2.7
Insoluble Residue (%)	0.75 max	0.37
CO_2 (%)	-	1.2
Limestone (%)	5.0 max	3.1
$CaCO_3$ in Limestone (%)	70 min	89
Inorganic Processing Addition (%)	5.0 max	0.0
Potential Phase Compositions[C]:		
C_3S (%)	-	64
C_2S (%)	-	5
C_3A (%)	8 max	6
C_4AF (%)	-	9
$C_3S + 4.75C_3A$ (%)	-	93.9

Physical

Item	Limit[A]	Result
Air Content (%)	12 max	6
Blaine Fineness (m^2/kg)	260 min	386
Autoclave Expansion (%) (C151)	0.80 max	0.06
Compressive Strength MPa (psi):		
3 days	12.0 (1740) min	28.4 (4120)
7 days	19.0 (2760) min	36.2 (5260)
Initial Vicat (minutes)	45-375	92
Mortar Bar Expansion (%) (C1038)	-	0.004

Tests Data on ASTM Optional Requirements

Chemical

Item	Limit[A]	Result
Equivalent Alkalies (%)	0.60 max	0.55

Physical

Item	Limit[A]	Result
False Set (%)	50 min	72

Notes

[A] Dashes in the limit / result columns mean Not Applicable.

[B] It is permissible to exceed the specification limit provided that ASTM C1038 Mortar Bar Expansion does not exceed 0.020 % at 14 days.

[C] Adjusted per Annex A1.6 of ASTM C150 and AASHTO M85.

[D] Test result represents most recent value and is provided for information only. Analysis of Heat of Hydration has been carried out by CTLGroup, Skokie, IL.

Equavalent Alkalies (%) Minimum = 0.53, Maximum = 0.57

This data may have been reported on previous mill certificates.

Additional Data

Inorganic Processing Addition Data

Item	Result[A]
Type	-
Amount (%)	-
SiO_2 (%)	-
Al_2O_3 (%)	-
Fe_2O3 (%)	-
CaO (%)	-
SO_3 (%)	-

Base Cement Phase Composition

Item	Result
C_3S (%)	66
C_2S (%)	5
C_3A (%)	6
C_4AF (%)	10

By , Quality Manager

BASF

The Chemical Company

September 02, 2015

MMC Materials Inc
1117 South Raceway Road
Greenville, MS 38701

Attention: Carl Edwards
Project: Any
Project location: Any

Certificate of Conformance
MasterAir® AE 90 Admixture (formerly MB-AE 90)
BASF Corporation Air-Entraining Admixture for Concrete"

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:
That MasterAir AE 90 admixture is a BASF Corporation Air-Entraining Admixture for concrete; and
That MasterAir AE 90 and MB AE 90 admixture are the same product having identical composition, differing only in designation; and
That no calcium chloride or chloride based ingredient is used in the manufacture of MasterAir AE 90 admixture; and
That MasterAir AE 90 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.000068 percent (0.68 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and
That MasterAir AE 90 admixture meets the requirements of ASTM C260, the Standard Specification for Air-Entraining Admixtures for Concrete, as well as the requirements for air-entraining admixtures as specified in Corps of Engineers' CRD-C 13 and AASHTO M154.

Richard Hubbard III

Richard Hubbard
Sr. Technical Marketing Specialist

BASF Corporation
Admixtures Systems
23700 Chagrin Boulevard
Cleveland, Ohio 44122
Telephone (216) 839-7500

MASTER® BUILDERS SOLUTIONS

BASF

The Chemical Company

September 02, 2015

MMC Materials Inc
1117 South Raceway Road
Greenville, MS 38701

Attention: Carl Edwards
Project: Any
Project location: Any

Certificate of Conformance
MasterPozzolith® 322 Admixture (formerly Pozzolith 322N)
BASF Corporation Admixture for Concrete

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:
That MasterPozzolith 322 admixture is a BASF Corporation Water-Reducing Admixture for concrete; and
That MasterPozzolith 322 and Pozzolith 322N admixture are the same product having identical composition, differing only in designation; and
That no calcium chloride or chloride based ingredient is used in the manufacture of MasterPozzolith 322 admixture; and
That MasterPozzolith 322 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00024 percent (2.4 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and
That MasterPozzolith 322 admixture meets the requirements for a Type A, Water Reducing, Type B, Retarding, and Type D, Water Reducing and Retarding Admixture specified in ASTM C494/C494M and AASHTO M194, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Type A, Type B and Type D admixtures as specified in Corps of Engineers' CRD-C 87.

Richard Hubbard III

Richard Hubbard
Sr. Technical Marketing Specialist

BASF Corporation
Admixtures Systems
23700 Chagrin Boulevard
Cleveland, Ohio 44122
Telephone (216) 839-7500

MASTER® BUILDERS SOLUTIONS

BASF

The Chemical Company

September 02, 2015

MMC Materials Inc
1117 South Raceway Road
Greenville, MS 38701

Attention: Carl Edwards
Project: Any
Project location: Any

Certificate of Conformance
MasterGlenium® 7500 Admixture (formerly Glenium 7500)
BASF Corporation Admixture for Concrete

I, Richard Hubbard, Sr. Technical Marketing Specialist for BASF Corporation, Cleveland, Ohio, certify:
That MasterGlenium 7500 admixture is a full-range water-reducing admixture manufactured by BASF Corporation; and
That MasterGlenium 7500 admixture and Glenium 7500 admixture are the same product having identical composition, differing only in designation; and
That no calcium chloride or chloride based ingredient is used in the manufacture of MasterGlenium 7500 admixture; and
That MasterGlenium 7500 admixture, based on the chlorides originating from all the ingredients used in its manufacture, contributes less than 0.00017 percent (1.7 ppm) chloride ions by weight of the cement when used at the rate of 65 mL per 100 kg (1 fluid ounce per 100 pounds) of cement; and
That MasterGlenium 7500 admixture meets the requirements for a Type A, Water-Reducing and Type F, Water-Reducing, High Range Admixture specified in ASTM C494/C494M, the Standard Specification for Chemical Admixtures for Concrete, as well as the requirements for Type A and Type F admixtures as specified in Corps of Engineers' CRD-C 87 and AASHTO M194.

Richard Hubbard III

Richard Hubbard
Sr. Technical Marketing Specialist

BASF Corporation
Admixtures Systems
23700 Chagrin Boulevard
Cleveland, Ohio 44122
Telephone (216) 839-7500

MASTER® BUILDERS SOLUTIONS

Starkville Laboratory
PO Box 1347
Starkville, MS 39760

Starkville Laboratory
217 Industrial Drive
Starkville, MS 39759

Phone: 662.324.9372
Fax: 662.323.1299

Material	Fine Aggregate
SOURCE & Pit #:	APAC 2-8-11
SAMPLES FROM:	Plant Stock Piles
FOR USE AT:	Greenwood

Date Sampled:	08/26/15
Date Tested:	08/28/15
SAMPLED BY:	CE
TESTED BY:	CE

Sample Weight **473.10g**

GRADATION PASS OR FAIL **Pass**

SIEVE in	SIEVE mm	IND. WT RET (g)	CUM. WT RET (g)	TOTAL % RET.	TOTAL % PASS	MDOT SPECIFICATIONS		SIEVE in	INDIVIDUAL WT. RETAINED
0.50	12.50			0.0%	100.0%	100%			
0.38	9.50	0.00	0.00	0.0%	100.0%	97% - 100%		0.38	
NO.4	4.75	18.20	18.20	3.8%	96.2%	92% - 100%		NO.4	
NO.8	2.36	40.60	58.80	12.4%	87.6%	75% - 100%		NO.8	
NO.16	1.18	42.80	101.60	21.5%	78.5%	45% - 90%		NO.16	
NO.30	600-um	95.70	197.30	41.7%	58.3%	25% - 70%		NO.30	
NO.40	425-um	156.60	353.90	74.8%	25.2%			NO.40	
NO.50	300-um	93.70	447.60	94.6%	5.4%	3% - 35%		NO.50	
NO.100	150-um	23.90	471.50	99.7%	0.3%	0% - 10%		NO.100	
PAN		1.40	472.90	100.0%				PAN	
Total Retained			472.90g						

Total Amount within 0.3% or 1.42g	Yes	
Sieve Overloaded if individual amount retained greater than 200 g.	OK	

FINENESS MODULUS (F.M.)

F.M.	2.74
Pit Base F.M.	
Within Tolerance	

Sand Equivalency (ASTM D2419)

Trial#	Sand Reading	Clay Reading
1	2.3	2.4
2		
Sand Equivalency		97.39%

ORGANICS COLOR No.

SPECIFIC GRAVITY WEIGHTS

WT. PYC. W/WATER	1267.30
SSD WT.	507.10
WT. PYC. SAMPLE	1582.10
OVEN DRY WT.	504.30

SPECIFIC GRAVITY

APPARENT SPECIFIC GRAVITY	2.661
BULK DRY SPECIFIC GRAVITY	2.622
BULK SSD SPECIFIC GRAVITY	2.637
ABSORPTION %	0.56%

PREPARED BY:
CARL EDWARDS

DATE:

Starkville Laboratory
PO Box 1347
Starkville, MS 39760

Starkville Laboratory
217 Industrial Park Road
Starkville, MS 39759

Phone: 662.324.9372
Fax: 662.323.1299

Material	#67 Gravel
SOURCE & Pit #:	APAC 2-8-11
SAMPLES FROM:	Plant Stock Piles
FOR USE AT:	Greenwood

Date Sampled:	08/26/15
Date Tested:	08/28/15
SAMPLED BY:	CE
TESTED BY:	CE

Sample Weight **5322.30g**

GRADATION PASS OR FAIL **Pass**

SIEVE in	SIEVE mm	IND. WT RET (g)	CUM. WT RET (g)	TOTAL % RET.	TOTAL % PASS	MDOT SPECIFICATIONS		SIEVE in	INDIVIDUAL WT. RETAINED
2.50	63.00			0.0%	100.0%				
2.00	50.00			0.0%	100.0%				
1.50	37.50			0.0%	100.0%				
1.25	31.50			0.0%	100.0%				
1.00	25.00	0.00	0.0	0.0%	100.0%	100%		1.00	
0.75	19.00	563.80	563.8	10.6%	89.4%	80%- 100%		0.75	
0.50	12.50	2451.30	3015.1	56.7%	43.3%			0.50	
0.38	9.50	1178.30	4193.4	78.8%	21.2%	20%- 55%		0.38	
NO.4	4.75	1083.60	5277.0	99.1%	0.9%	0% - 10%		NO.4	
NO.8	2.36	23.00	5300.0	99.6%	0.4%	0%- 5%		NO.8	
PAN		20.80	5320.80	100.0%				PAN	
Total Retained			5320.80g						

Total Amount within 0.3% or 15.97g	Yes	
Sieve Overloaded?	OK	

FINENESS MODULUS (F.M.)

F.M.	6.88
Pit Base F.M.	
Within Tolerance	

SPECIFIC GRAVITY

APPARENT SPECIFIC GRAVITY	2.644
BULK DRY SPECIFIC GRAVITY	2.505
BULK SSD SPECIFIC GRAVITY	2.557
ABSORPTION %	2.10%

SPECIFIC GRAVITY WEIGHTS

SATURATED WT. IN WATER	4660.5
SSD AIR WEIGHT	7653.2
OVEN DRY WEIGHT	7495.9

PREPARED BY:
Carl Edwards

DATE: